Commentary: Epidemiological transition, migration, and cardiovascular disease

Francesco P Cappuccio

The study of change in patterns of health and disease across populations has been of interest since Thomas Malthus in 1798 argued that 'population growth will always tend to outrun the food supply' and that 'betterment of the lot of mankind is impossible without stern limits on reproduction'.[1] Since then, the theories on the health of populations in transition have developed[2] with the groundbreaking contribution given to public health by Abdel Omran.[3] In his essay of 1971 Omran conceptualizes with five propositions the theory of epidemiological transition in which degenerative and man-made diseases displace pandemics of infection as the primary causes of morbidity and mortality. The determinants of this transition, in his view, are ecobiological (interaction between biology and environment), socioeconomic, psychological, and medical (biotechnology and public health). Furthermore, Omran distinguishes between the 'Classical' transition (gradual and progressive from high mortality and high fertility to low mortality and low fertility) seen in England & Wales in the 19th century, the 'Accelerated' transition (faster decline in mortality rate) seen in Japan in the early 20th century, and the 'Contemporary' transition (slow and unsteady decline in mortality, but high fertility rates, thus rapid population growth) currently seen in developing countries. In societies around the world we now observe two main distinct phenomena: first, a rapidly growing movement of populations between locations where there are large differences in health indicators or where there are differences in the nature and practice of health care. Migration and mobility of populations are responsible for health differentials between origin and destination.[4] Second, whilst the transition in the now developed countries was predominantly socially determined, the transition in the now developing countries is significantly influenced by medical technology. Indeed, with the control of the traditional infectious diseases (e.g. diarrhoea, malaria, and tuberculosis) and the decline in infant mortality rates, chronic diseases are becoming more prevalent. Ischaemic heart disease and stroke are now the most common causes of death in the world. Seventy per cent of these deaths occur in developing countries.[5,6] Even considering the impact of the HIV/AIDS epidemic, they will remain the most common causes of morbidity, disability, and death in developing countries in 2020.[5,6]

An intriguing aspect of the epidemiology of vascular disease around the world is the consistent report that stroke is an important cause of morbidity, disability, and death in adults of black African origin, whether living in Africa, the Caribbean, US, or the UK.[7] After studying trends in stroke mortality in the US among African Americans,[8] Gillum has suggested six stages of the epidemiological evolution of patterns of cardiovascular

disease among black people of sub-Saharan African origin (Figure 1).[9] The evolution is characterized by advancing acculturation, urbanization, and affluence with a progressive increase in salt intake, smoking habit, and saturated fat intake. The earlier stages (from 2 to 4) see the appearance of hypertension (and associated stroke) as the predominant form of cardiovascular disease whilst atherosclerosis (and associated ischaemic heart disease) is predominant in the later stages (4 and 5). In stage 6 Gillum then postulates a decline in morbidity and mortality from vascular disease attributable to better prevention and management. Interestingly, he explains the low mortality rates in Caribbean-born African Americans under the age of 65 by the selective migration of the better-educated and more affluent. The transition of many from the original stage 3 (moderate affluence, fat intake, and smoking, and high salt intake and hypertension) to stage 6 (high affluence, moderate fat intake, smoking, and salt intake, and controlled hypertension and atherosclerosis). This contrasts with the high mortality rates common to older Caribbean-born African Americans as well as US-born African Americans. This could be attributed to migration in an earlier era, when access to the educational and employment opportunities was barred to most black people in the US, thus forcing them into stage 5 (moderate affluence, high fat intake, smoking, and salt intake, and high hypertension and atherosclerosis).[9]

In the current issue of the *International Journal of Epidemiology*, Harding[10] describes similar effects in older Caribbean migrants to England & Wales prior to 1971. In her analysis of the Office for National Statistics Longitudinal Study, a 1% sample of the population of England & Wales, she explores whether mortality of Caribbean migrants is associated with duration of residence and/or age at migration. Assessment at baseline was performed in 1971 (when the study started) and follow-up (by record linkage) extended up to 2000, i.e. 30 years. Country of birth at the 1971 Census was used to identify migrants born in the Caribbean Commonwealth countries. Those not appearing at a subsequent census (probably because of re-migration), those older than 54 and under 25 years in 1971, and a further 401 who emigrated, were all excluded, leaving 1540 Caribbean migrants, aged 25–54 years in 1971, eligible for analysis. The results show that stroke mortality increases with increasing duration of residence prior to 1971 and age at migration in the oldest age cohort. The results are of interest because they are the first of this kind to be published from the UK. However, the report raises some questions. Firstly, the results apply only to England & Wales, rather than the UK as a whole. Secondly, the power of the study is very limited and the study may conceal important differences not detected here. For instance, the mortality changes from stroke according to age at migration and duration of residence may not be confined to the older cohort, as hazard ratios are large (though not significant) in the younger

Department of Community Health Sciences, St George's Hospital Medical School, Cranmer Terrace, London SW17 0RE, UK. E-mail: f.cappuccio@sghms.ac.uk
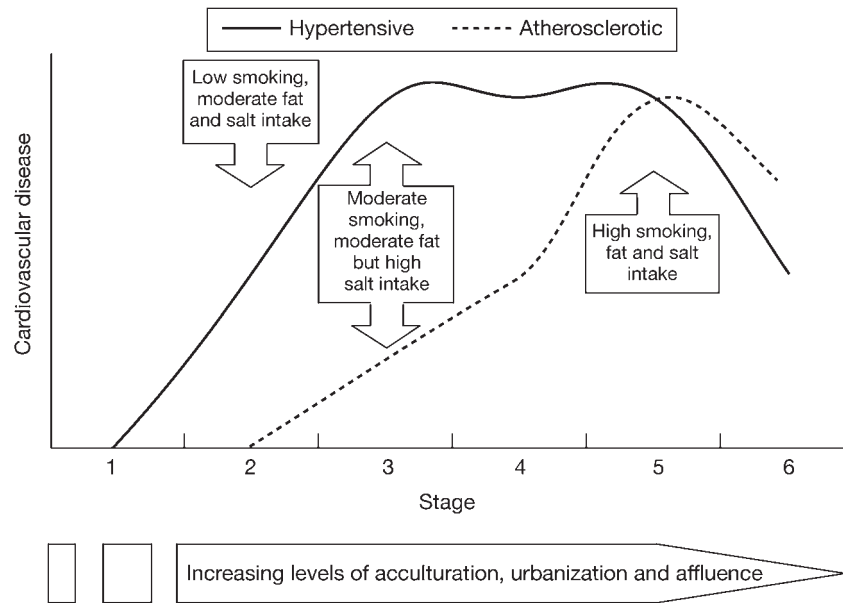
Figure 1 Gillum's stages in the epidemiological evolution of patterns of cardiovascular disease among people of sub-Saharan African origin

cohort too. If these were true, some of the explanations provided shall need to be revisited. As occurred in the US, the older migrants were less affluent and educated than the younger (or more recent) migrants, with implications for access to healthcare and take-up of preventive medicine. However, the epidemiology of stroke in Caribbean populations around the world suggests that this high burden is unlikely to be fully explained by socioeconomic differentials.[11] Thirdly, migrants from sub-Saharan African Commonwealth countries also represent an important group with a high burden of stroke. It is unfortunate that a similar analysis could not be carried out in this sub-group, due to the limitations of the 1971 Census questions and the later immigration of West Africans into the UK. Opportunities to study West African adults in Africa and in the UK should be seized in the future. Finally, these findings, as many other migration and population studies,[12] argue very strongly against the view that stroke in black African populations is mainly due to genetic considerations.

Notwithstanding the limitations, the present study highlights an important area of research currently grossly neglected and under funded in the UK. With the growing importance of ethnic background for the understanding of disease processes, tailoring management strategies,[13] and improving health care services, there is a need for prospective data in ethnic minorities in the UK. In the meantime, an attempt should be made to best use available data on ethnic minority groups nationally.

References

[1] Malthus T. *An Essay on the Principle of Population*. London: printed for J Johnson in St Paul's Church-Yard, 1798.

[2] Caldwell JC. Population health in transition. *Bull World Health Organ* 2001;**79:**159–70.

[3] Omran AR. The epidemiologic transition. A theory of the epidemiology of population change. *Milbank Mem Fund Q* 1971;**29:**509–38.

[4] MacPherson DW. Human health, demography and population mobility. *Migration & Health Newsletter*, International Organization for Migration, Geneva, Switzerland, 2001;**1:**1–4.

[5] Murray CJL, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. *Lancet* 1997;**349:**1436–42.

[6] Murray CJL, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. *Lancet* 1997;**349:**1269–76.

[7] Poulter NR, Cappuccio FP, Chaturvedi N, Cruickshank JK. *High Blood Pressure and the African-Carribean Community in the UK*. MediNews: Egbaston, 1997.

[8] Gillum RF. Stroke mortality in blacks. Disturbing trends. *Stroke* 1999;**30:**1711–15.

[9] Gillum RF. The epidemiology of cardiovascular disease in black Americans. *N Engl J Med* 2001;**335:**1597–99.

[10] Harding S. Mortality of migrants from the Caribbean to England and Wales: effect of duration of residence. *Int J Epidemiol* 2004;**33:**382–86.

[11] Cappuccio FP. Ethnicity and cardiovascular risk: variations in people of African ancestry and South Asian origin. *J Hum Hypertens* 1997;**11:**571–76.

[12] Cooper R, Rotimi C, Ataman S *et al.* The prevalence of hypertension in seven populations of West African origin. *Am J Public Health* 1997;**87:**160–68.

[13] Cappuccio FP, Oakeshott P, Strazzullo P, Kerry SM. Application of Framingham risk estimates to ethnic minorities in United Kingdom and implications for primary prevention of heart disease in general practice: cross sectional population based study. *BMJ* 2002;**325:**1271–76.